

LEWES BPW WWTP Biweekly InSight Report

Date: 2/10/2021

From: Erin Horocholyn - Suez Water Technologies & Solutions
 To: Darrin Gordon, Austin Calaman, Inframark
 cc: Matt Stapleford - Suez Water Technologies & Solutions

System Equipment

4 × ZW trains, each train consists of 4 - 500D cassettes, 120 modules x 370 sq. ft. per train (surface area 44,400 sq. ft. per train)

Replacement membranes installed Q1 2020 on trains UF3 and UF4

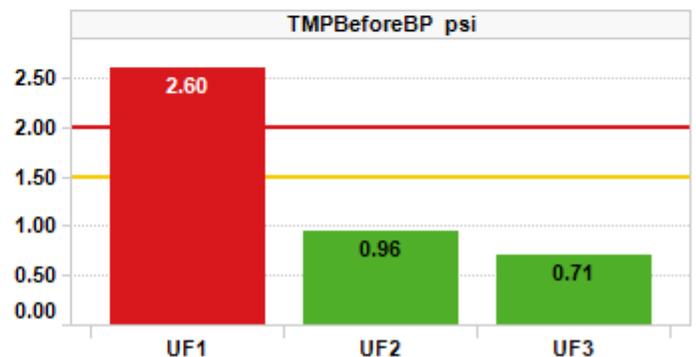
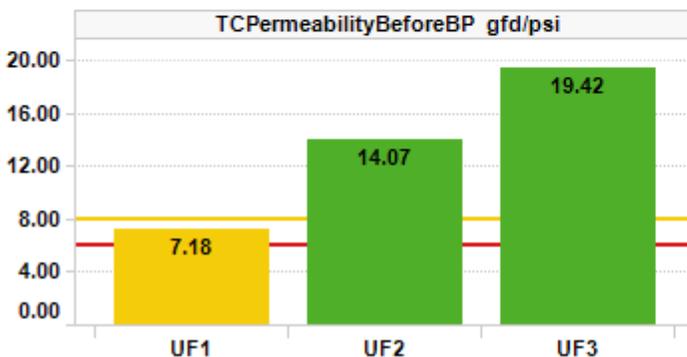
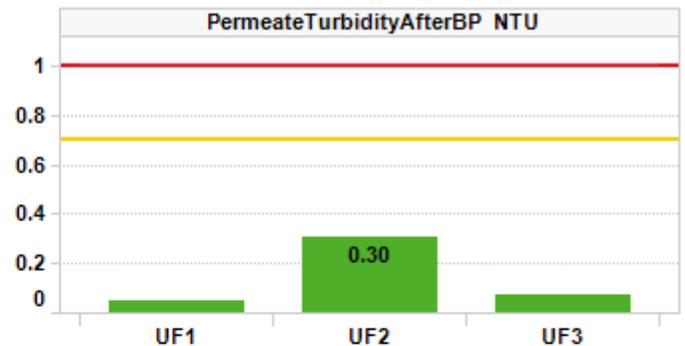
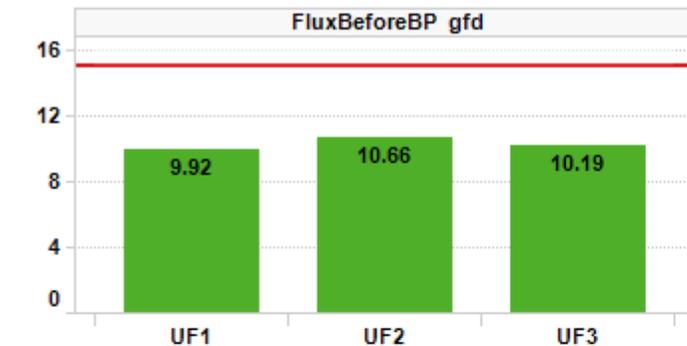
Cleaning Strategy

Recovery cleaning - 2 NaOCl @ 2000 ppm dose/1000 ppm soak per year, 1 Citric acid @ 2000 ppm per year

Maintenance cleaning - 1 NaOCl per week @ 200 ppm, 1 Citric acid per week @ 2000 ppm

KPI Dashboard – Avg values through reporting period

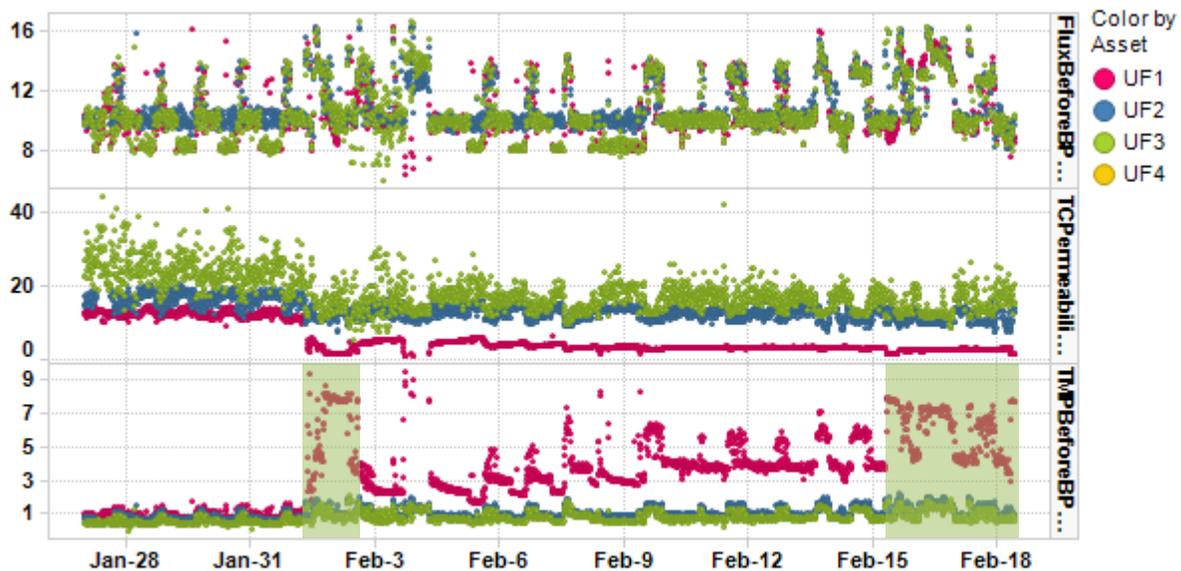
■ Action Required
■ Caution
■ No Limits
■ Normal



Plant Summary

Overall trains UF2 and UF3 operated well, with good TMPs and permeabilities. UF4 is pulled for cleaning and is offline. UF1 has had fouled levels of permeability and TMPs since Feb 1 and shows new in-cycle fouling possibly indicating sludge build up in the fibers. This train may require a tank drain, inspection, and cleaning.

- Daily permeate production averaged 1.0 MGD. Flow peaked on Jan 31 at 1.2 MGD. Train UF4 was off during this report
- Flux BBP averages ranged from 9.92 – 10.66 gfd across trains. Flux was higher from Feb 1 – 4, during which TMPs rose and permeability was suppressed
- Average TMP BBP was good on trains UF2 and UF3, averaging 0.96, and 0.71 psi respectively. Train UF1 averaged 2.60 psi, up 67%. From Jan 27 – Feb 1, UF1’s TMP averaged 0.97 psi. From Feb 1 – 2, UF1 was in TMP control for about 24 hours. After Feb 4, UF1’s flux had returned to normal, but TMP trends remained high and have climbed slowly over the following week, averaging 4.40 psi on Feb 9. There is also an appearance of a large gap between TMP before and after BP values, indicating new in-cycle fouling, which can indicate solids build-up. This train may also require a tank drain to inspect the modules for solids, and if present, manual cleaning of the modules and potentially the aerators’ center and distribution channels. Periods of UF1 in TMP control are highlighted on the graph in shaded boxes



- TC permeability BBP was excellent on UF2 and UF3, averaging 14.07 and 19.42 gfd/psi respectively. Train UF4 averaged 12.32 gfd/psi before Feb 1, then 3.68 gfd/psi after, which is below the TCP threshold of ~4.0 gfd/psi indicating heavily fouled membranes in this train
- Permeate turbidity ABP averaged 0.05, 0.30, and 0.08 NTU on UF1, UF2, and UF3
- UF1, UF2, and UF3 had 2 hypo and 2 citric MCs, and UF4 had 1 hypo MC in this report

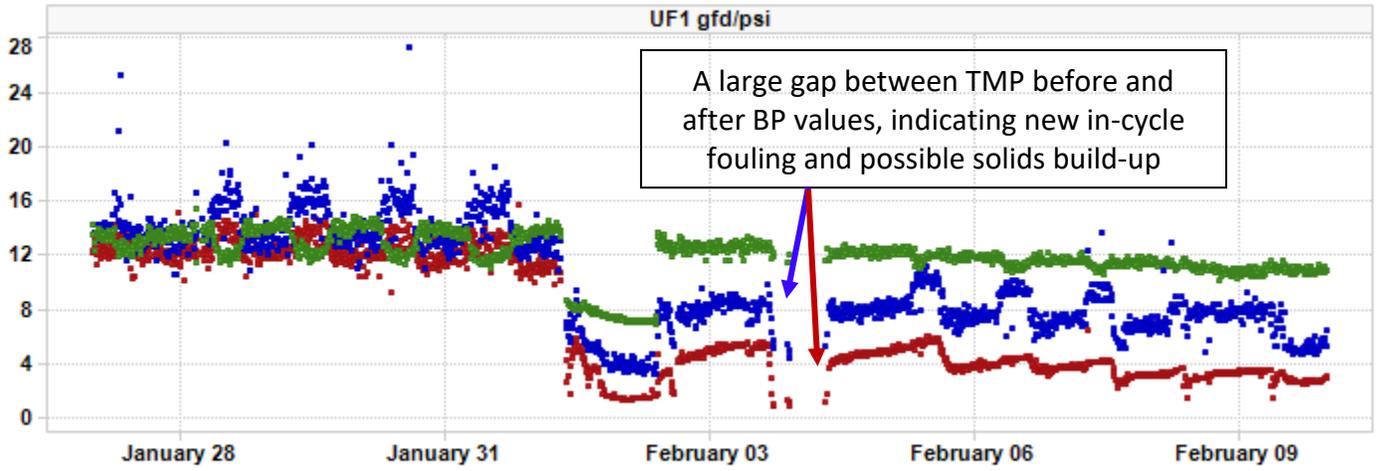
Acronyms:

TC = temperature corrected, BBP = before backpulse, ABP = after backpulse, DBP = during backpulse, RC = recovery clean, MC = maintenance clean, TMP = trans membrane pressure

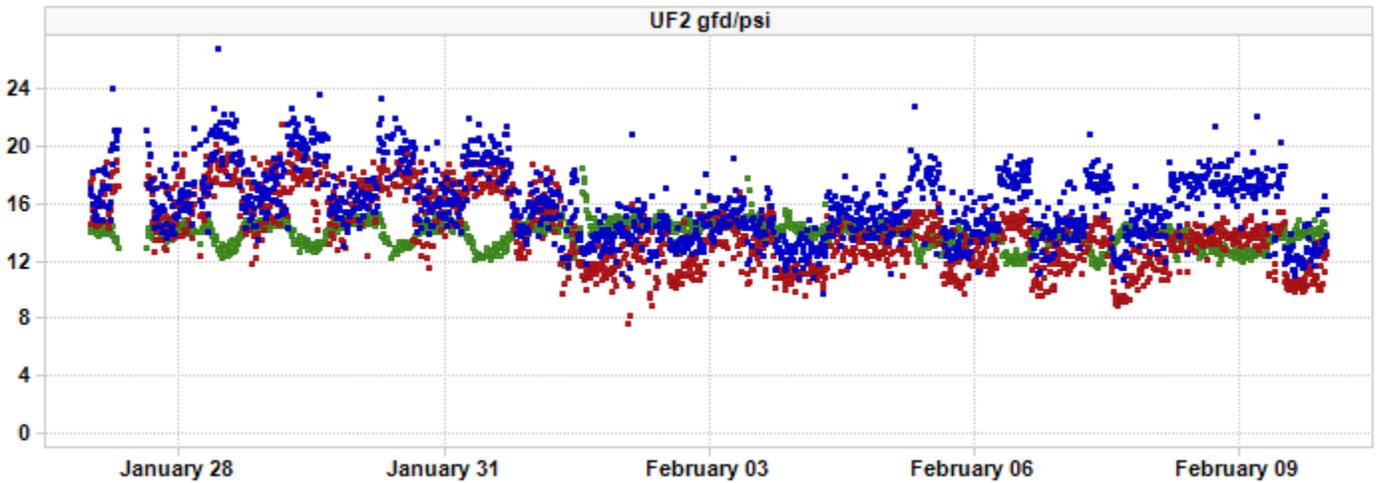


TC Permeability Trends By Train

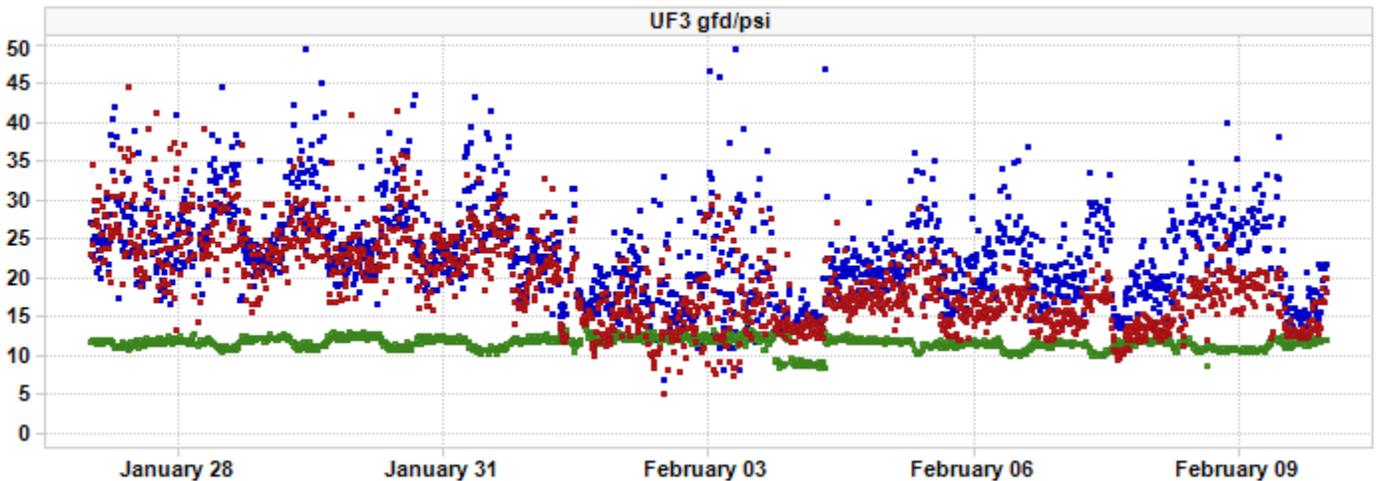
■ TCPermeabilityAfterBP
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■ TCPermeabilityAfterBP
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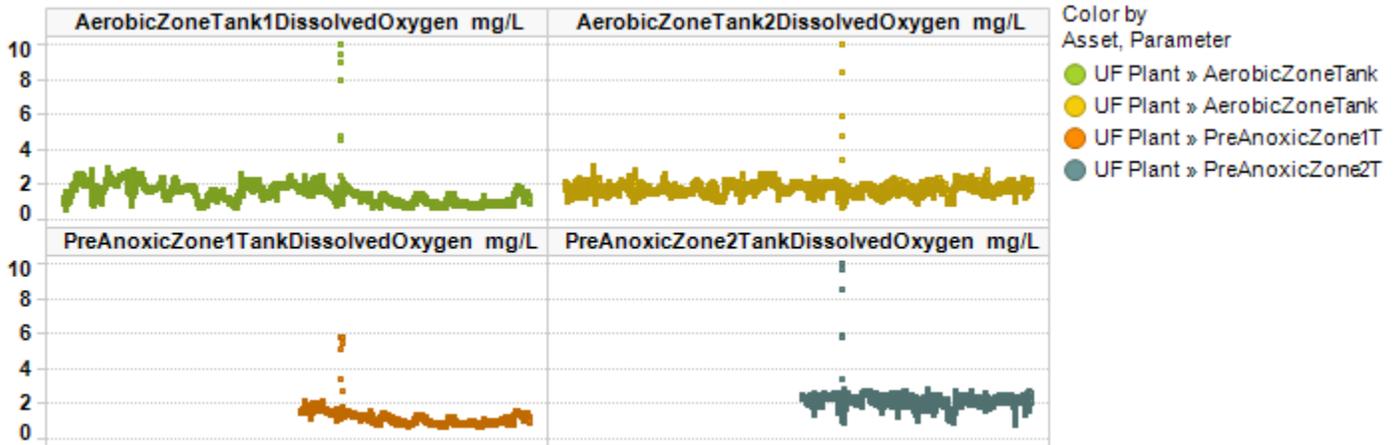


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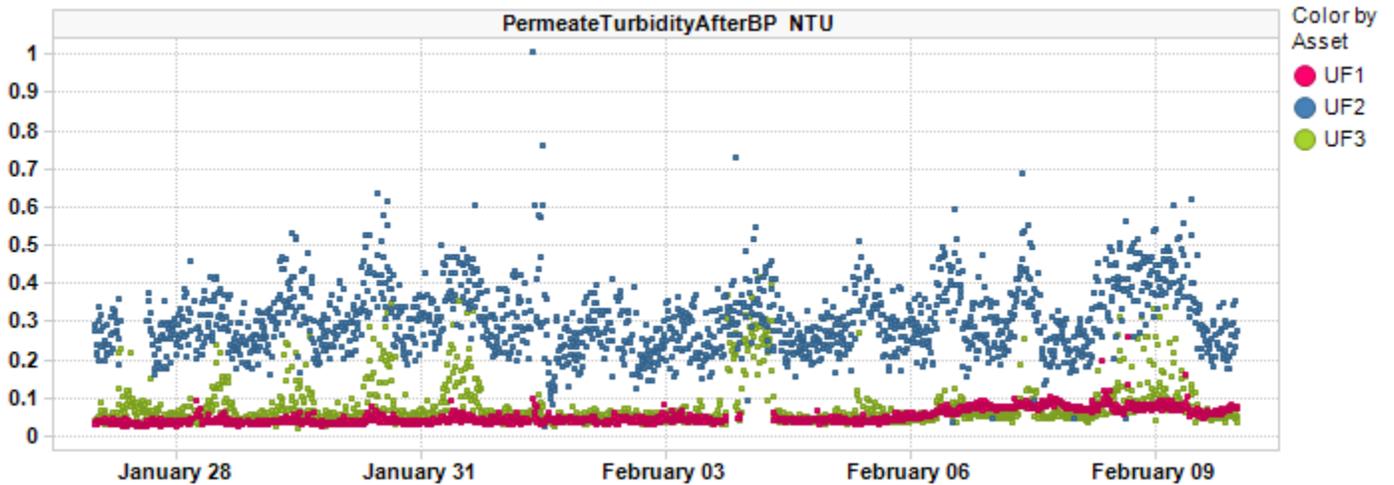




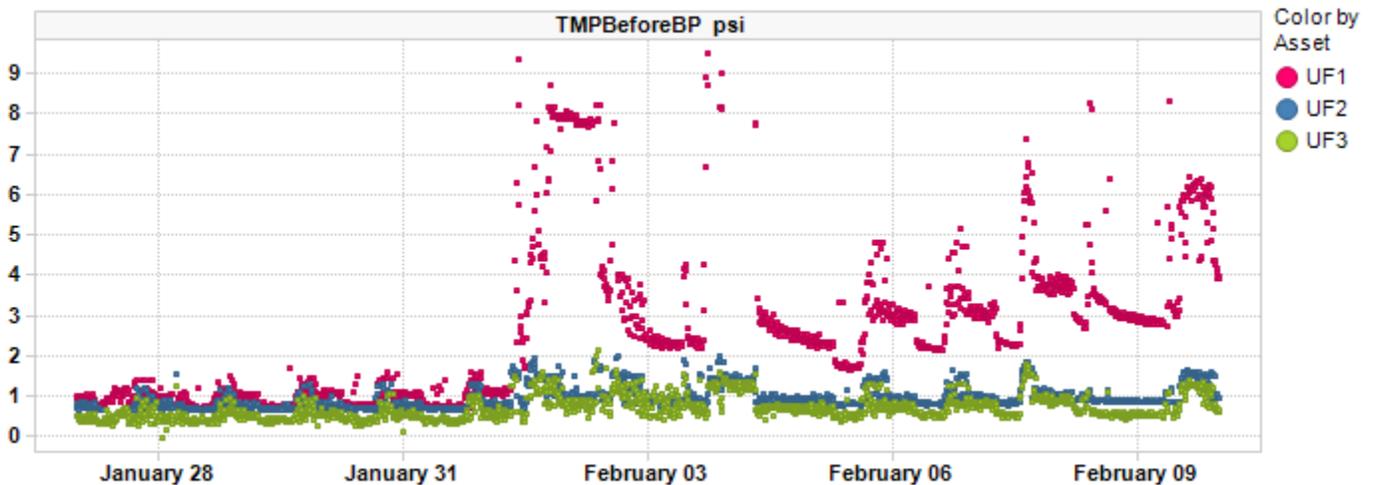
Bioreactor Dissolved Oxygen



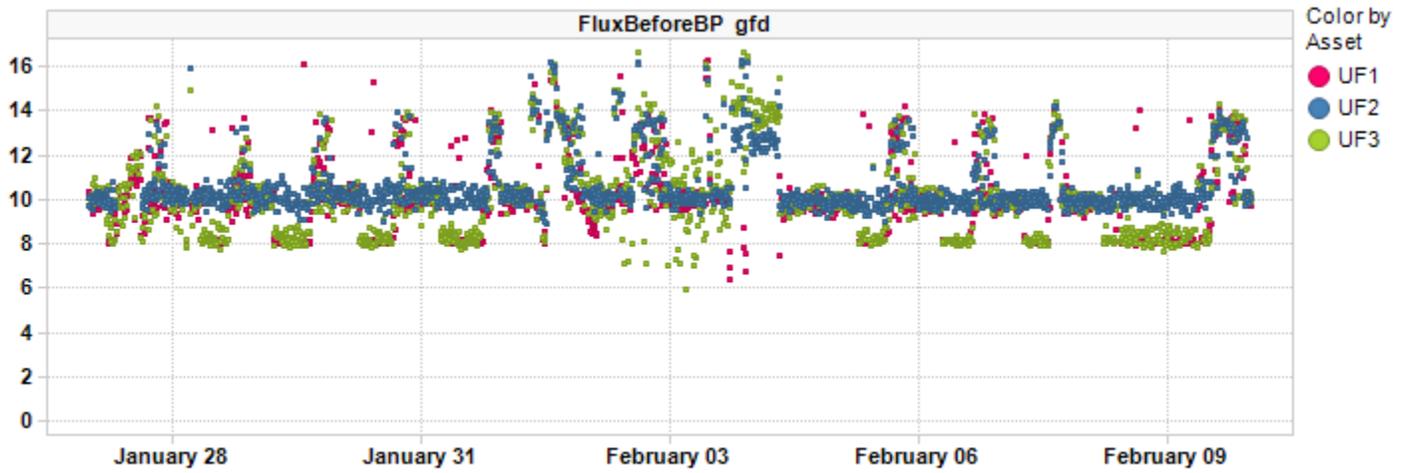
Permeate Turbidity Trend



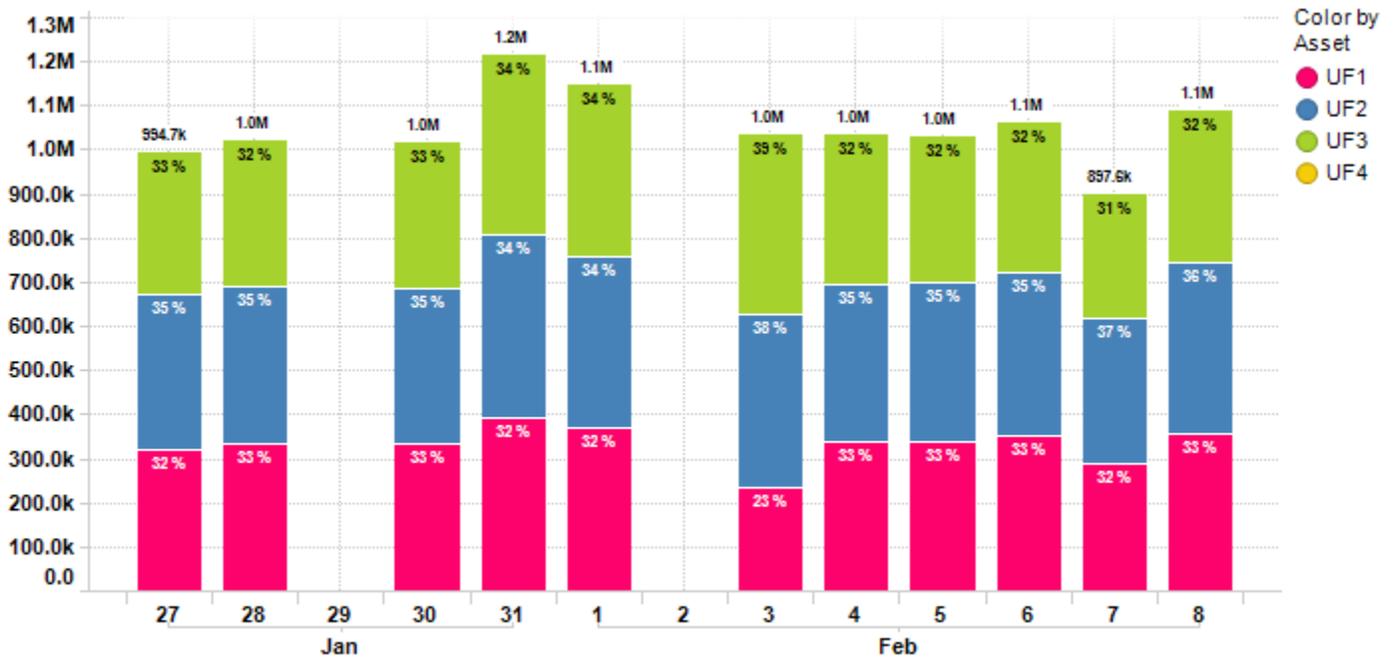
Before BPTMP Trend



Before BP Flux Trend



Daily Permeate Flow



Average Daily permeate flow from 1/27/2021 to 2/9/2021 is 1.0M gal with a maximum daily flow of 1.2M gal.



Asset Summary

KPI Parameters	Value/Change	UF1	UF2	UF3	UF4
FluxBeforeBP gfd	Value	9.92	10.66	10.19	
	Change	4.86 %	15.14 %	9.32 %	
FluxDuringBP gfd	Value	18.97	18.63	18.67	
	Change	0.59 %	0.73 %	0.73 %	
PermeateTurbidityAfterBP NTU	Value	0.05	0.30	0.08	
	Change	3.55 %	18.77 %	-32.34 %	
TCPermeabilityBeforeBP gfd/psi	Value	7.18	14.07	19.42	
	Change	-84.34 %	-1.84 %	-28.24 %	
TMPBeforeBP psi	Value	2.60	0.96	0.71	
	Change	66.69 %	22.38 %	34.98 %	
TotalPermeateFlowDaily gal	Value	332.24k	369.03k	346.67k	0.00
	Change	15.40 %	59.13 %	32.33 %	0.00 %

Plant Summary

KPI Parameters	Value/Change	UF Plant
TotalPermeateFlowDaily gal	Value	1.05M
	Change	29.05 %

Contract Expiry Date : 08/11/2021

For InSight technical assistance please email insight.src@suez.com or please call technical support at 1 866 271 5425 or 905 469 7723 and follow the prompts, if you require after hours assistance please contact the 24/7 Emergency number provided in your plant documentation. This email is a summary of issues identified during a manual review of InSight data from the time period above. This review is an analysis of data that is logged by InSight and identifies key plant performance issues determined from this data. This data review was not focused on minor data issues but on identifying possible existing and/or upcoming critical operational issues.

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LEWES BPW WWTP Biweekly InSight Report

Date: 2/24/2021

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System Equipment

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Replacement membranes installed Q1 2020 on trains UF3 and UF4

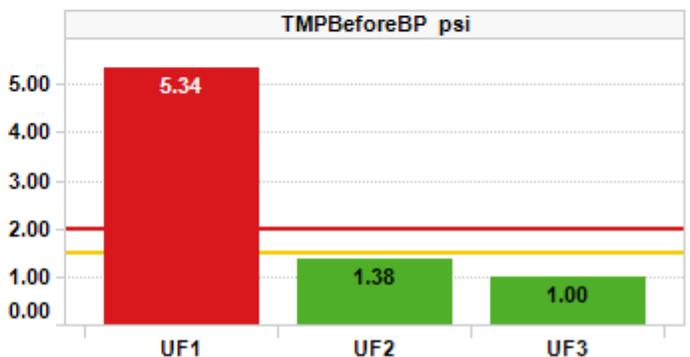
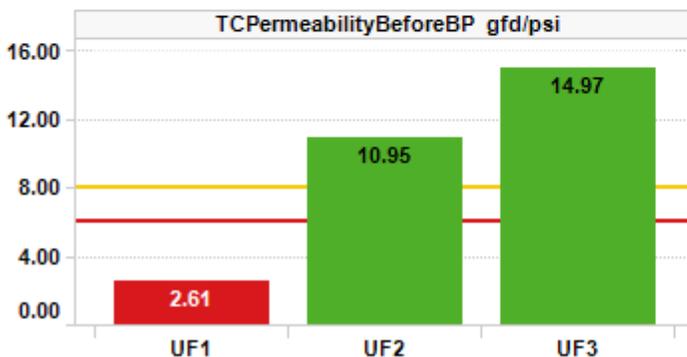
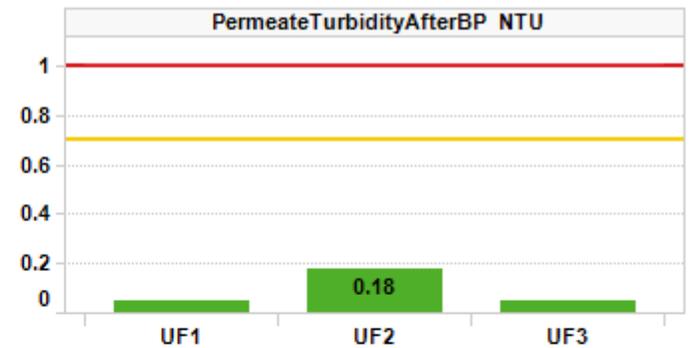
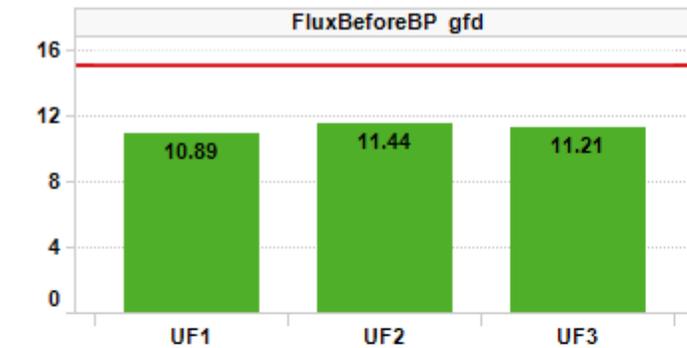
Cleaning Strategy

Recovery cleaning - 2 NaOCl @ 2000 ppm dose/1000 ppm soak per year, 1 Citric acid @ 2000 ppm per year

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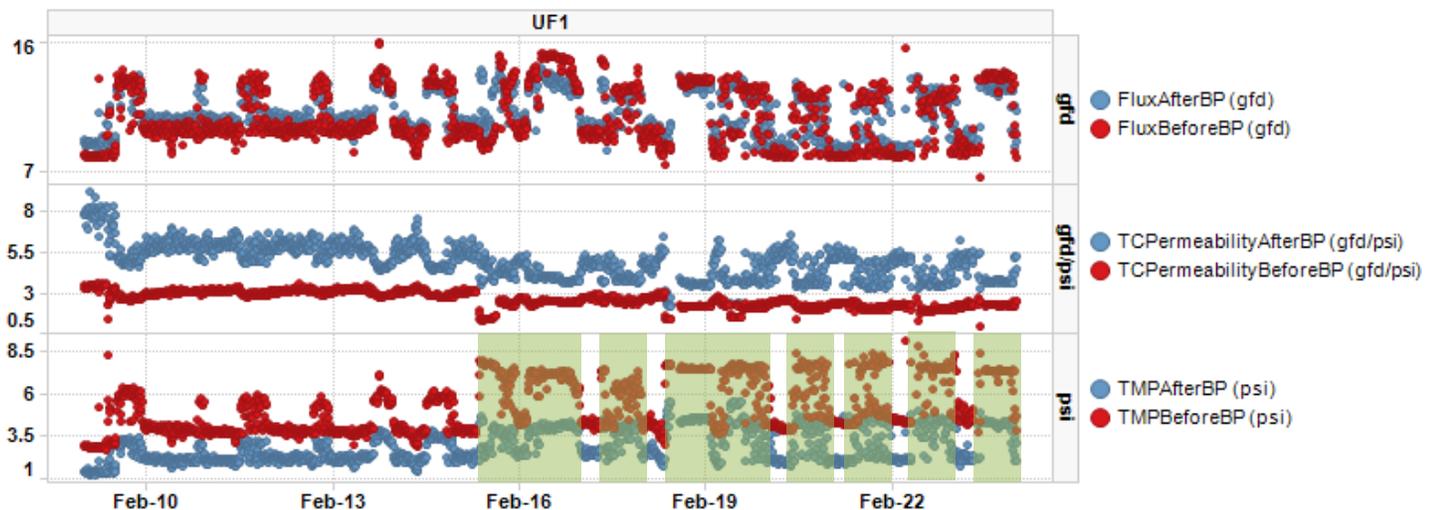
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Plant Summary

Overall trains UF2 and UF3 operated well, with good TMPs and permeabilities. UF4 is pulled for cleaning and is offline. UF1 has had fouled levels of permeability and TMPs since Feb 1 with in-cycle fouling possibly indicating sludge build up in the fibers. This train should be inspected for solids and may require cleaning.

- Daily permeate production averaged 1.2 MGD. Flow peaked on Feb 16 at 1.5 MGD. Train UF4 was off during this report
- Flux BBP averages ranged from 10.89 – 11.44 gfd across trains. Flux was higher and variable from Feb 14 - 23, during which TMPs rose and permeability was suppressed. UF1 especially had high TMPs during these days, hitting TMP control
- Average TMP BBP was good on trains UF2 and UF3, averaging 1.38 psi (up from 0.96 psi), and 1.00 psi (up from 0.71 psi) respectively. Train UF1 averaged 5.34 psi (up from 2.60 psi). From Feb 10 – 14, UF1's TMP averaged 4.23 psi. After Feb 14, UF1's TMP averaged 5.88 psi. There is also a large gap between TMP and TC permeability before and after BP values indicating in-cycle fouling, which can indicate solids build-up. This train should have its modules inspected for solids, and if present, will need manual cleaning of the modules and potentially the aerators' center and distribution channels. Periods of UF1 in TMP control are highlighted on the graph in shaded boxes



- TC permeability BBP was excellent on UF2 and UF3, averaging 10.95 and 14.97 gfd/psi respectively. Train UF1 averaged 2.61 gfd/psi, 3.06 gfd/psi before Feb 14, then 2.29 gfd/psi after, which is below the TCP threshold of ~4.0 gfd/psi indicating heavily fouled membranes in this train
- Permeate turbidity ABP averaged 0.05, 0.18, and 0.05 NTU on UF1, UF2, and UF3
- UF2 and UF3 had 2 hypo and 1 acid MCs. UF1 had 3 hypo and 2 acid MCs. UF4 had one 2-hour acid RC

Acronyms:

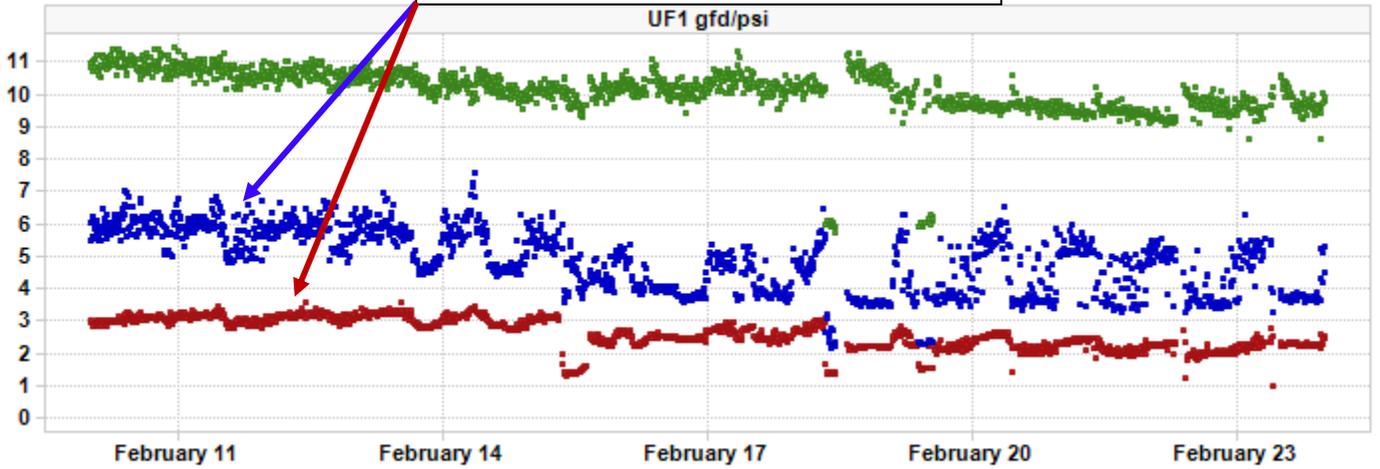
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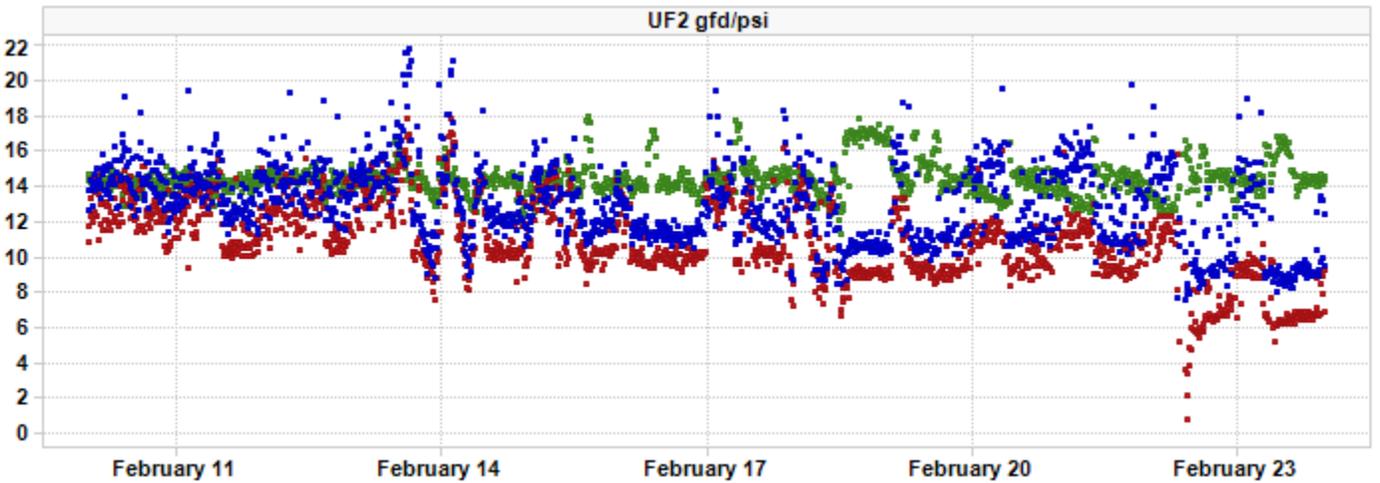
TC Permeability Trends By Train

A large gap between TMP before and after BP values, indicating in-cycle fouling and possible solids build-up

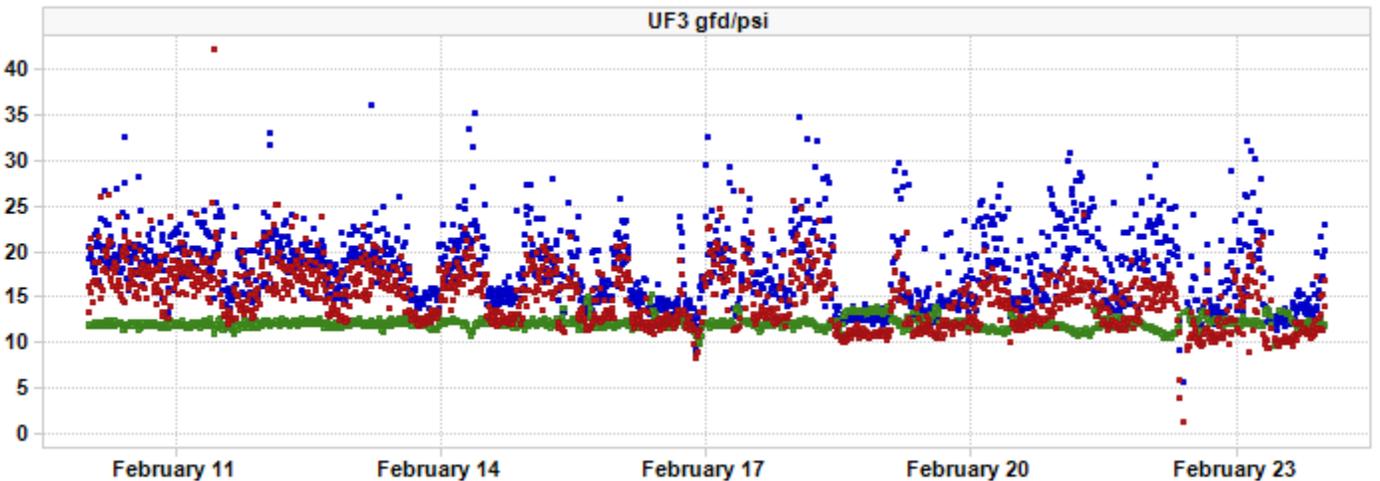
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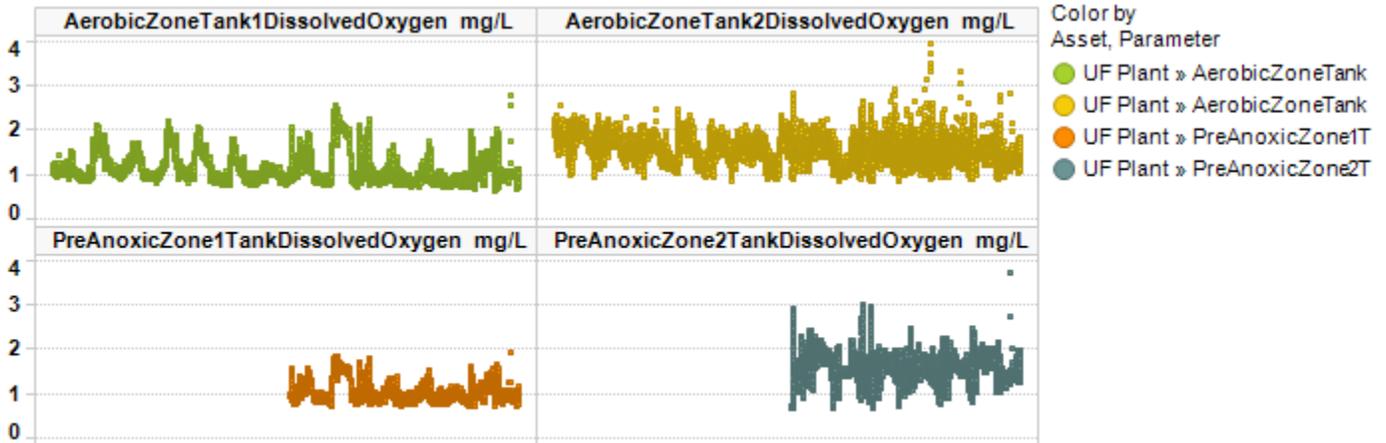


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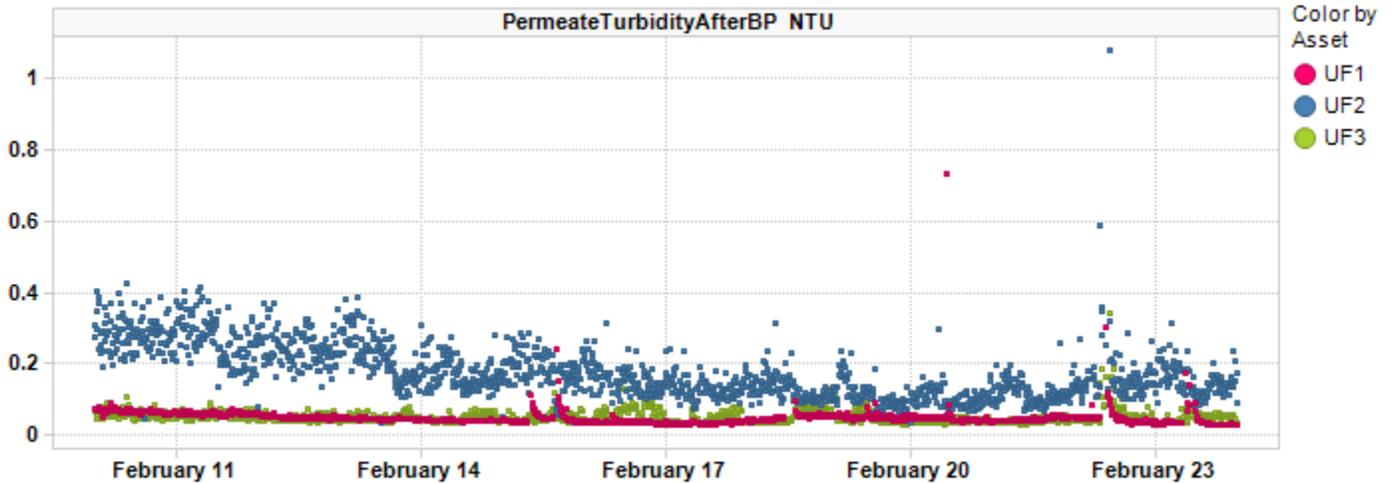




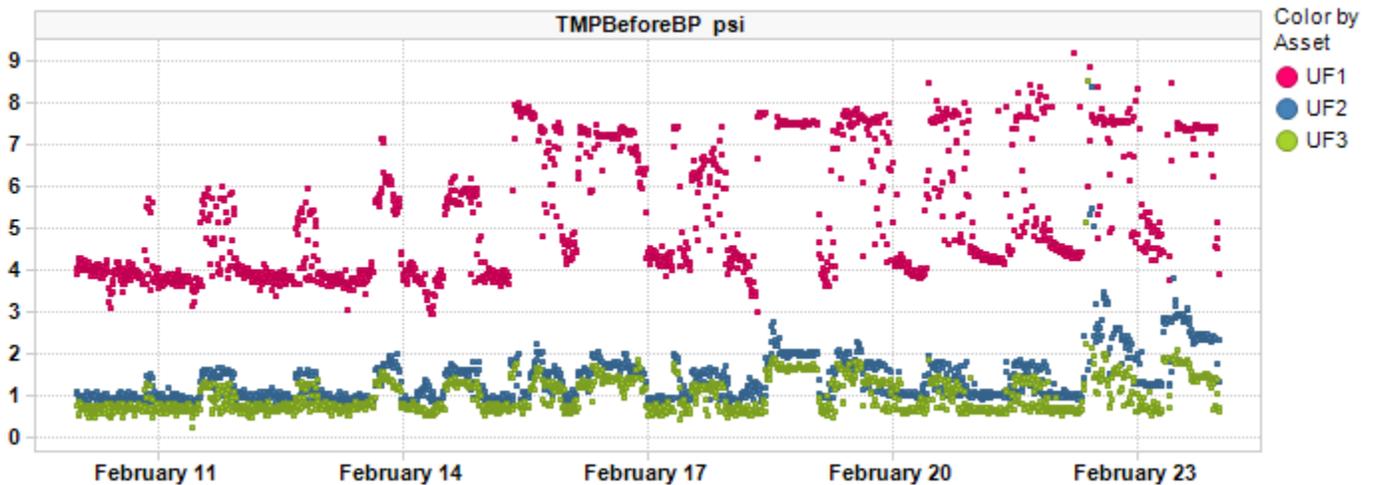
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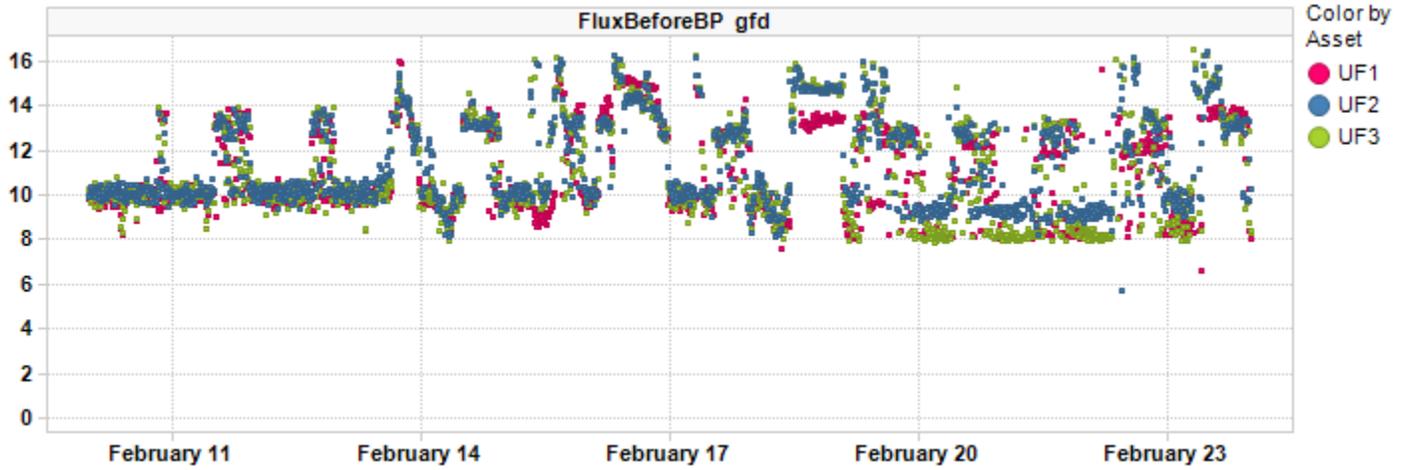
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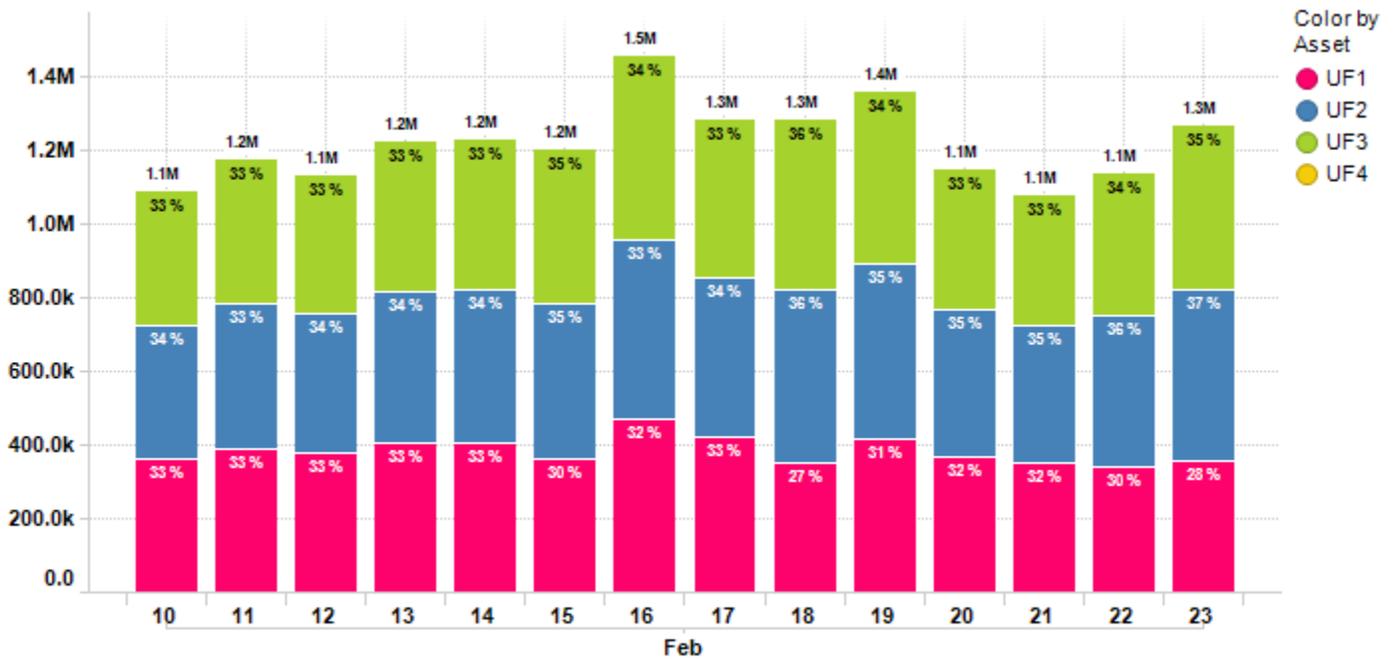
Before BPTMP Trend



Before BP Flux Trend



Daily Permeate Flow



Average Daily permeate flow from 2/10/2021 to 2/23/2021 is 1.2M gal with a maximum daily flow of 1.5M gal.



Asset Summary

KPI Parameters	Value/Change	UF1	UF2	UF3	UF4
FluxBeforeBP gfd	Value	10.89	11.44	11.21	
	Change	8.87 %	6.80 %	9.07 %	
FluxDuringBP gfd	Value	18.87	18.59	18.63	
	Change	-0.53 %	-0.20 %	-0.24 %	
PermeateTurbidityAfterBP NTU	Value	0.05	0.18	0.05	
	Change	-9.71 %	-73.74 %	-52.39 %	
TCPermeabilityBeforeBP gfd/psi	Value	2.61	10.95	14.97	
	Change	-175.40 %	-28.54 %	-29.77 %	
TMPBeforeBP psi	Value	5.34	1.38	1.00	
	Change	51.30 %	30.69 %	29.04 %	
TotalPermeateFlowDaily gal	Value	383.88k	420.67k	410.61k	0.00
	Change	13.45 %	12.28 %	15.57 %	0.00 %

Plant Summary

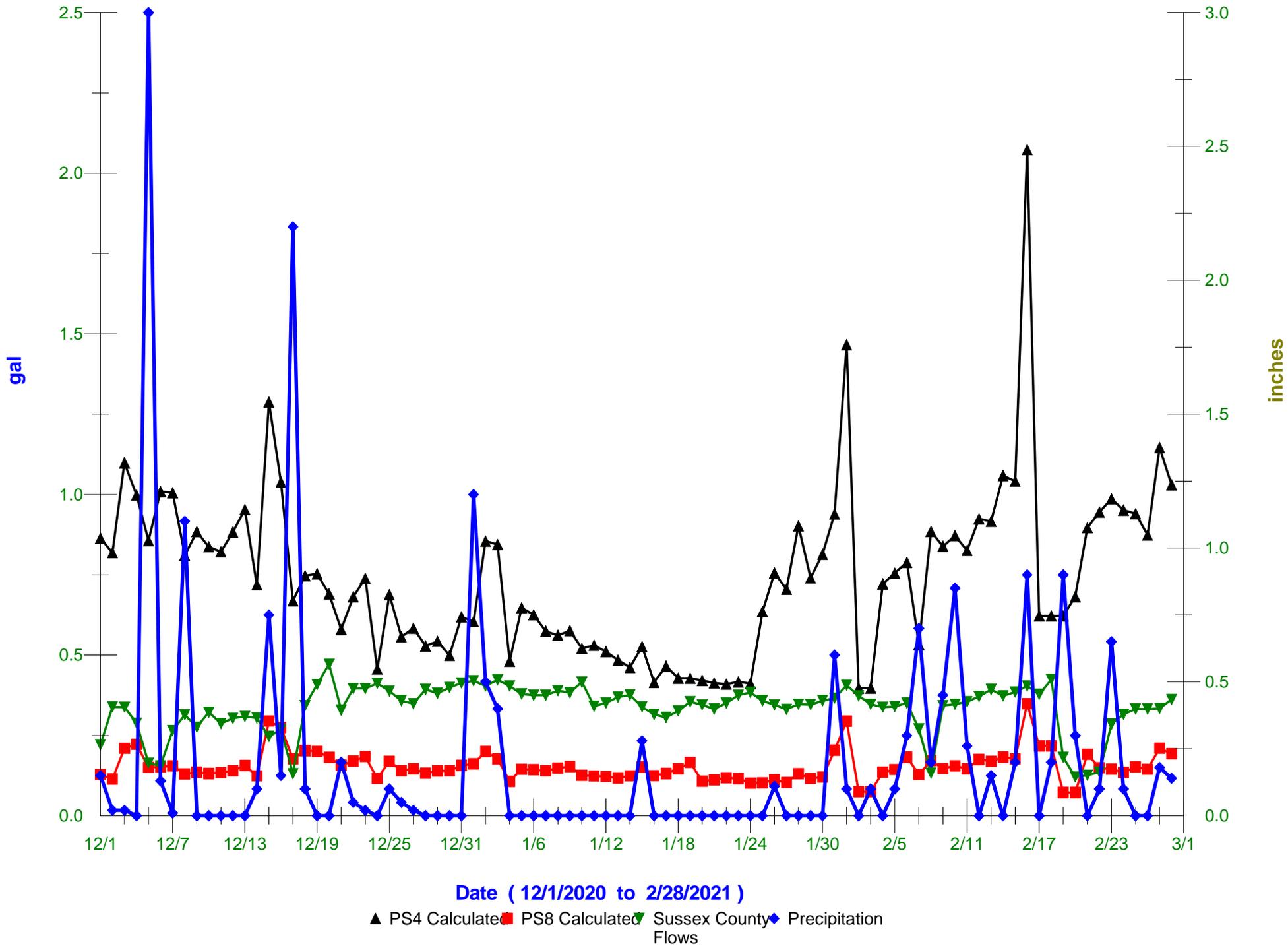
KPI Parameters	Value/Change	UF Plant
TotalPermeateFlowDaily gal	Value	1.21M
	Change	13.66 %

Contract Expiry Date : 08/11/2021

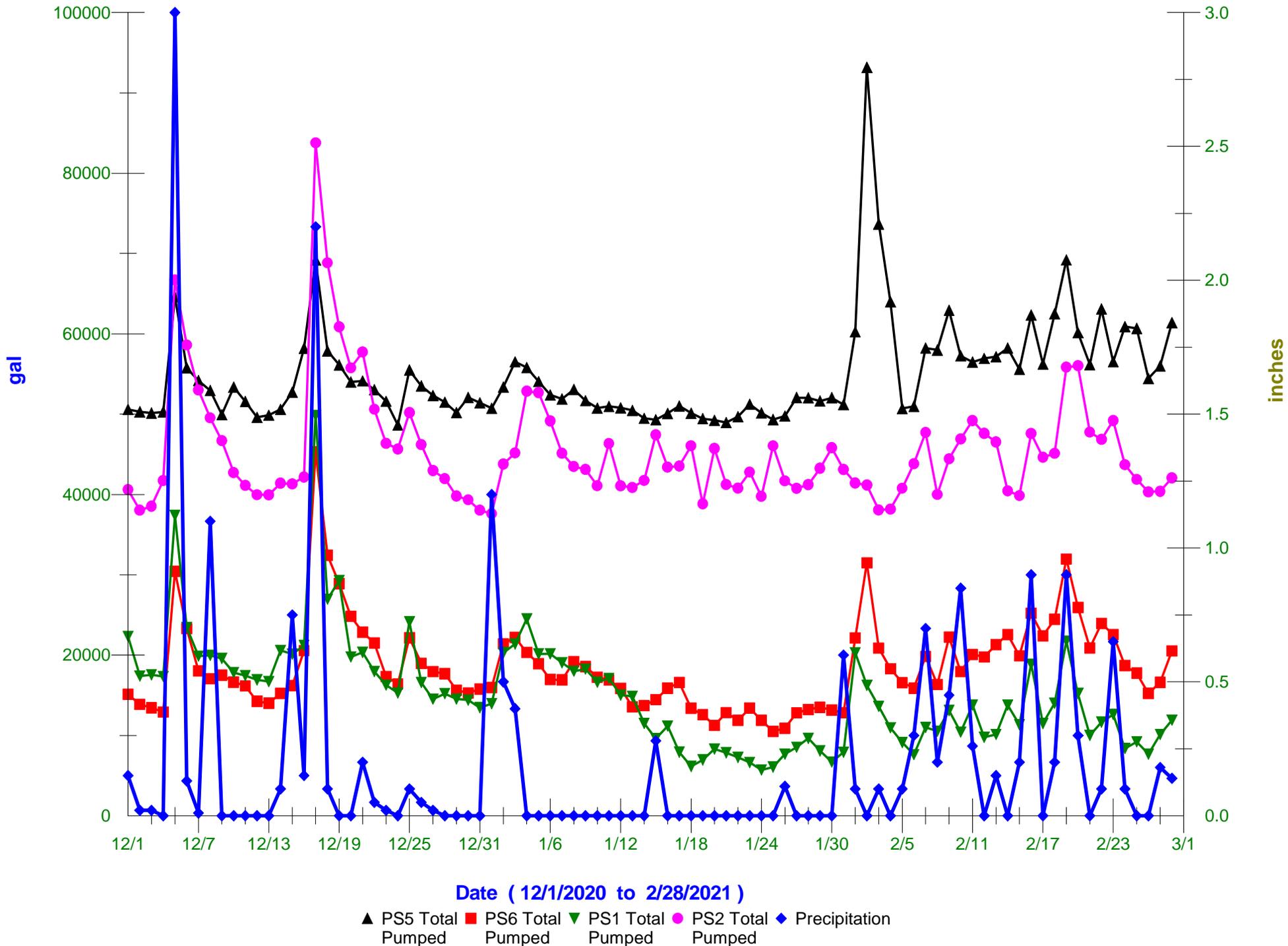
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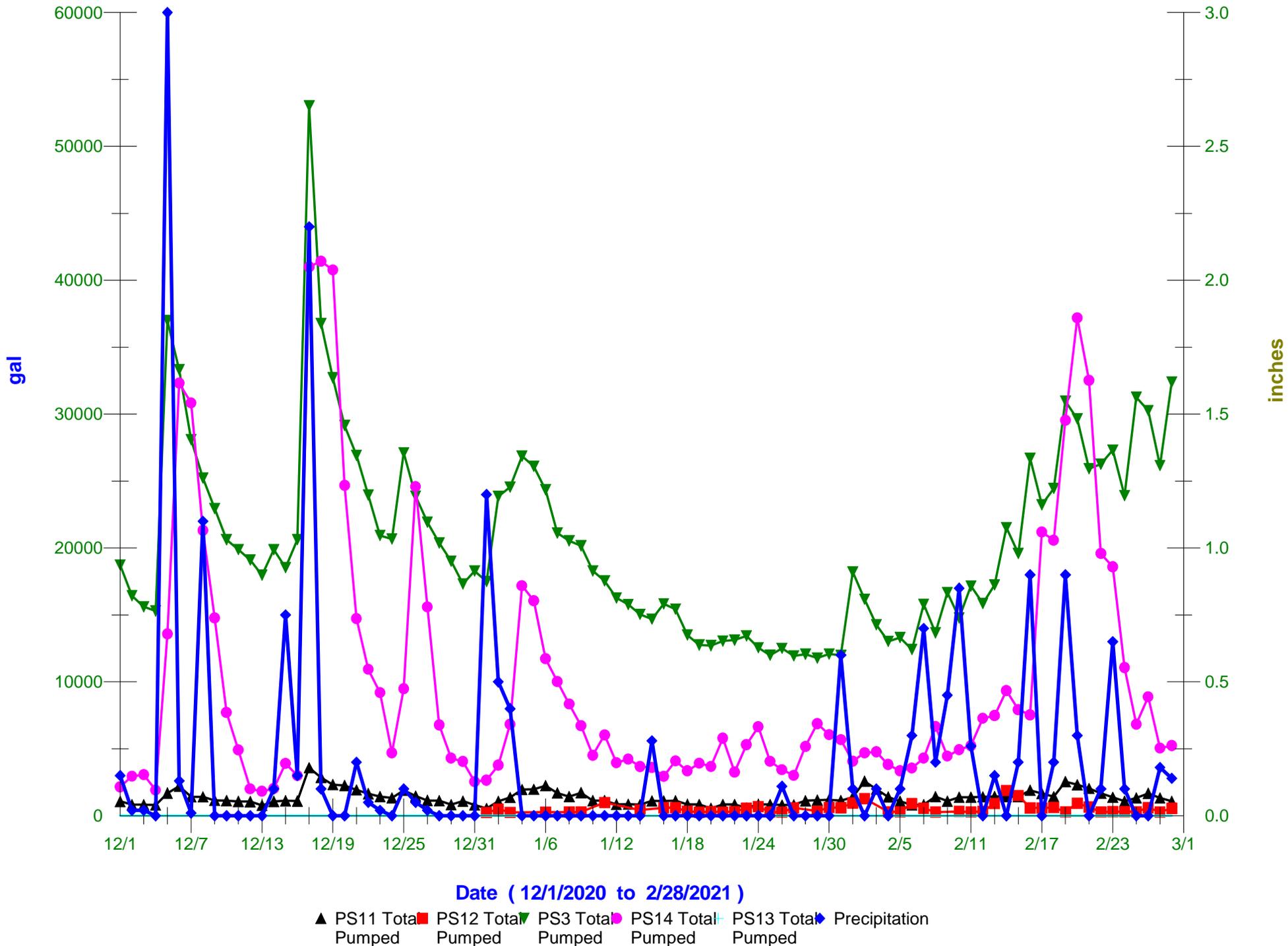
Data Over Time



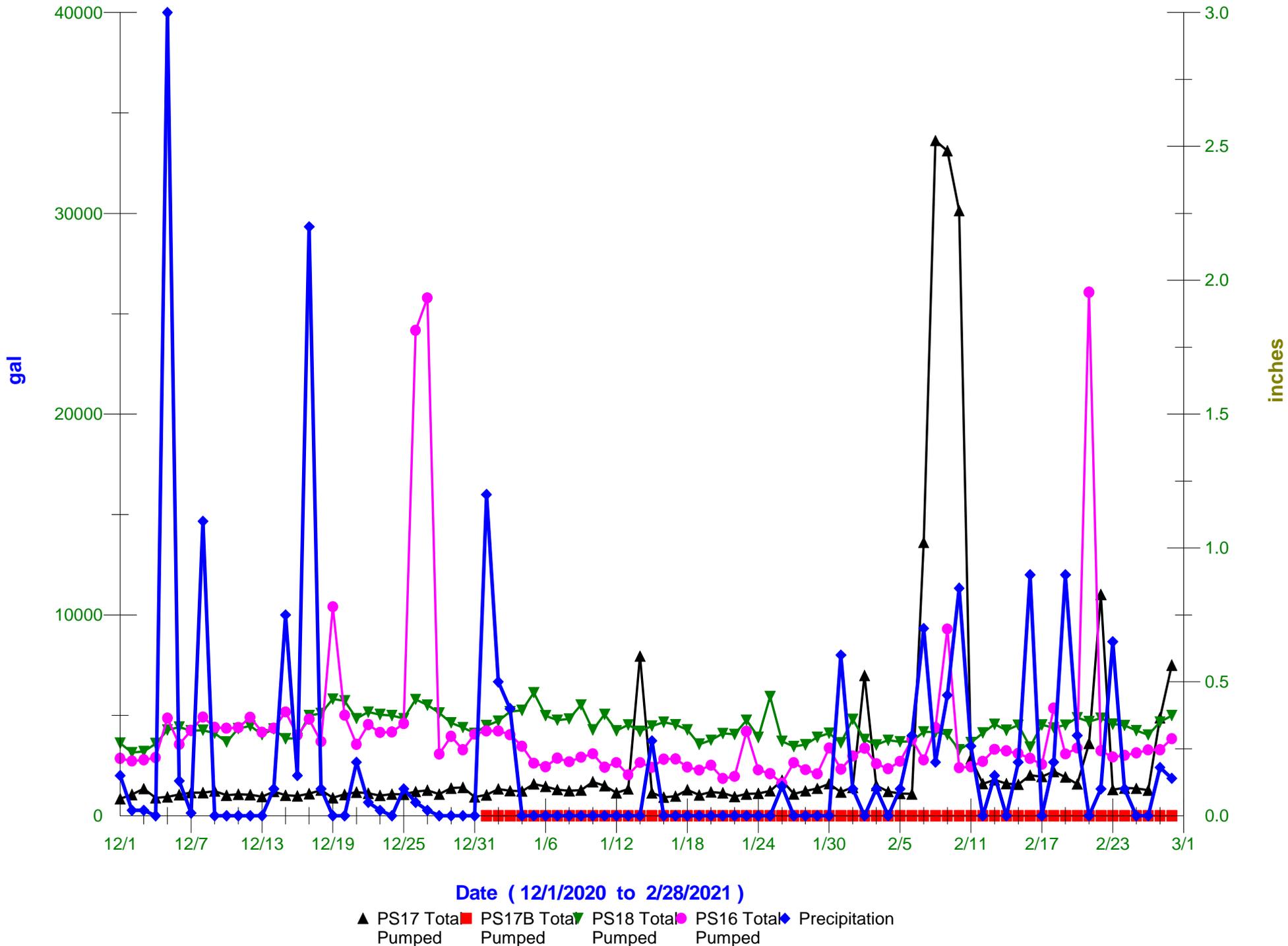
Data Over Time



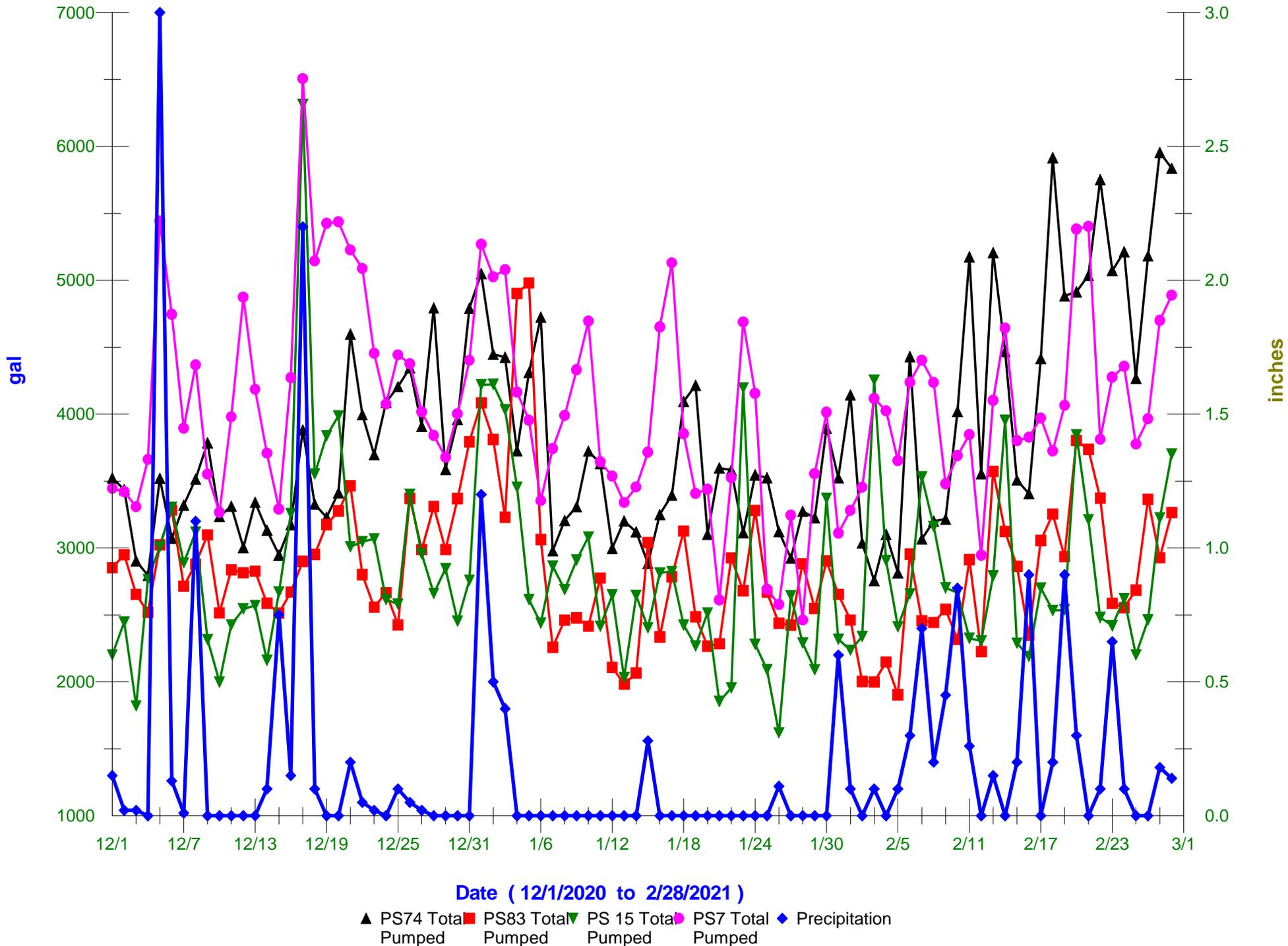
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